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THE OPERATIONAL ART OF ATTACK AND PURSUIT AVIATION
1917-1944

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

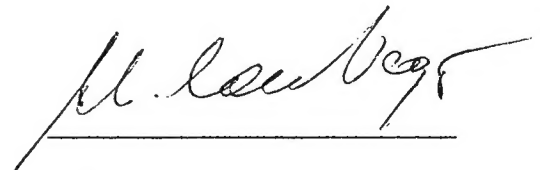


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The Operational Art of Attack and Pursuit Aviation, 1917-1944

Introduction

Operation Desert Storm was a success for many aspects of air warfare. In particular, the support that airpower provided for ground forces--interdicting enemy communications, isolating the battlefield from enemy air attack, and restricting the mobility of the Iraqi army, for example--enabled the ground offensive to meet its objectives in a mere 100 hours. How did this happen? Has airpower matured within the last twenty years, to the point that it can have this effect? In fact, the doctrine which allowed airpower to have such a decisive success in support of the ground war was mature by the end of World War II, and, as Col Karl Robinson, Director of the U.S. Army Strategic Studies Institute has noted, "A key factor in the operational success (of Operation Desert Storm) was a renaissance in the study of the operational art in the senior service schools of each of the armed services."¹

The formative years for air operational art were between the beginning of World War I and the end of World War II. In 1917 the aviation branch of the Army Signal Corps "had no theories of aerial combat, or of any air operations except armed reconnaissance."² Theories of air operational art developed during the interwar years, and World War II's battles were their proving grounds. By the end of that war, airpower theory had matured at the strategic, operational, and tactical levels, in harmony with the state of technology. Although the emphasis was on strategic attack, the use of attack and pursuit aviation, which we now call interdiction and counterair, were developed during this era. After World War II, however, the advent of nuclear weapons, intercontinental aircraft and missiles; the rise of the superpowers and the resulting Cold War conspired to shift the emphasis of airpower virtually totally to strategic nuclear war, and the operational art was forgotten.

Since the 1970's there has been renewed interest in the operational art. Future U.S. military operations will rely heavily on power projection, in which land, air and naval forces may support each other. The lessons of operational art which began during World War I and were tested during World War II will be directly applicable to future operations.

Air forces can best support ground troops by providing operational fires and operational protection. This paper will trace the development of this idea during the interwar years and its refinement during World War II as the use of attack and pursuit in support of ground operations, in an attempt to answer two questions: were appropriate ideas developed in the interwar years, and were they applied in World War II? It will analyse the North African campaign and Operation Overlord in terms of the interwar concepts and whether or how they were applied. Allied air operations in North Africa and in Operation Overlord included examples of operational fires by attack aviation for the destruction and disruption of enemy lines of communication, which directly affected the outcome of the ground operations. The air operations were aided by the use of pursuit aviation for operational protection.

Current Air Force doctrine specifies aerospace missions which include counterair, interdiction, close air support (CAS), strategic attack and others. The missions which fulfill the concepts of operational fires and operational protection are interdiction and counterair, which were previously known as attack and pursuit. These missions are defined and described in Air Force Manual 1-1, *Basic Aerospace Doctrine of the United States Air Force*.

Interdiction, formerly called attack, disrupts, delays, or destroys an enemy's military potential before it can be used against friendly forces. It should complement and reinforce surface operations, but is conducted separately from them. It is conducted against the

movement and supply of an enemy's forces. Generally, interdiction deep in the enemy's rear cannot be considered operational fires, because it has a broad strategic-level effect, but it does not have a decisive impact on the conduct of the major operation or campaign. In contrast, targets closer to the battle are likely to cause more localized but quicker effects on the battle, and thus are of more immediate concern to surface maneuver units.³ This form of interdiction, sometimes called Battlefield Air Interdiction (BAI), equates to the concept of tactical fires. Attack of those targets in between these is considered operational fires. Air interdiction's ability to delay and disrupt enemy maneuver may devastate the enemy's plans and ability to respond to friendly forces, and may enhance friendly surface forces' operational or tactical advantages. Delay or disruption of enemy resupply and destruction of supplies and transportation limits the enemy's mobility, limits his ability to sustain intense, high-tempo operations, and makes him a lucrative target for destruction. Enemy forces attempting to move rapidly also are vulnerable to interdiction.⁴ These characteristics are directly related to the operational fire functions of facilitating maneuver of one's own forces, preventing or disrupting maneuver of the enemy's forces, isolating the area of operations, destroying or neutralizing the enemy's critical functions and facilities, creating gaps in enemy defenses, or destroying the enemy's second echelon or reserves.⁵ Control of the air is generally necessary for effective interdiction.

Counterair, previously known as pursuit, normally should be the first priority of aerospace forces. Air control enables air and surface forces to operate more effectively and denies these advantages to the enemy. As the degree of control increases, all other air and surface efforts become more effective. Any reduction in control threatens every other effort. Offensive actions are usually necessary to achieve air superiority or air supremacy. Targets should include forces and critical facilities.⁶ These characteristics fulfill the

operational fire functions of facilitating maneuver of one's own forces, isolating the battle area, and destroying the enemy's critical functions; and the operational protection functions of countering enemy maneuver and preserving one's own forces and freedom of action. This paper will address specifically the use of pursuit in providing operational protection for attack operations. What were the origins of these concepts?

Development of Concepts

During World War I, American aircrews learned to drop bombs from their machines, and first flew aircraft with machine guns fixed to them. Doctrine for the use of these new weapons systems developed after World War I in several phases. This doctrine did not use the term "operational art" or many of the terms associated with it, such as "operational fires" or "operational protection," but the mature doctrine, as it was demonstrated during World War II, included all of the concepts or elements of both operational fires and operational protection.

Lessons of World War I

When the U.S. entered World War I, these principles of airpower had already been established by the allies: "1) aerial superiority was prerequisite to successful air operations; 2) the only truly effective means of establishing and maintaining control of the air was through a determined offensive against the hostile air force; 3) when air attacks, both against hostile air forces and vital rear areas were carried out in depth, enemy reconnaissance and pursuit action against friendly front lines decreased; 4) limiting the air services to reconnaissance and observation failed to utilize to full advantage military aircraft which could take the war to the enemy by bombing and strafing; and 5) in battle the air arm was more effective if concentrated under a single command."⁷ Air operations during World War I included close support of infantry by observation and artillery spotting, pursuit of

enemy aircraft, and bombardment. By the end of the war, Air Service missions included reconnaissance, preventing enemy air observation, and disrupting enemy supplies and troop concentrations, to a depth of twenty-five kilometers.⁸ Principles 1, 2, and 3 show the beginnings of the modern concepts of counterair and interdiction. All three demonstrate the idea of countering enemy combat power in order to preserve the effectiveness of one's own force. Principle 3 specifically shows the idea of applying attack against ground targets in support of, but separate from, tactical actions.

Nurtured in the Air Corps Tactical School

The primary agent for development of ideas after the war was the Army air arm's school, created at Langley, VA as the Air Service Tactical School, and which was renamed the Air Corps Tactical School (ACTS) along with the change of the entire air arm in 1926. It moved to Maxwell, AL in the summer of 1931.⁹

For a few years after World War I, there were few new ideas on the employment of airpower. Air operations were closely related to ground strategy; pursuit was considered the most important element. By 1923, the concept of attack constituted immediate support for field forces: attacks against targets which lay beyond the range of artillery (in other words, by forces not engaged in the tactical maneuver), including troop columns, tanks, roads, communications, airdromes, cantonments, and supply and communications systems in the rear.¹⁰ Attacking these critical functions and facilities would isolate the area of operations and disrupt maneuver of enemy forces.

George C. Kenney was one of the main proponents of attack aviation. Then-Captain Kenney, an ACTS instructor at Langley from 1926 to 1929, wrote the textbooks for the Attack course. His first priority of close support (different from today's concept of "close air support") was control of the air, with the ultimate objective of interdiction, or isolation, of

the battlefield. Potential targets included "the enemy air force and other vulnerable objects beyond the range of artillery, especially lines of communication and supply,"¹¹ which was consistent with previous ideas.

Army TR-440-15

By 1926, the ideas of independent operations and strategic bombardment had begun to form.¹² Evolving theory, reflected in Army TR-440-15 and the ACTS Combined Air Force text, included three phases of air operations. The phases were national mobilization and concentration; between concentration and contact with the enemy; and finally between contact and the deployment of the main force. During the first phase, the emphasis would be on defensive air operations; the second would concentrate on achieving air superiority. The third phase would aim for air superiority, but would also shift to enemy bases on shore, landing terminals, transports, debarkation points, and rail terminals.¹³ These targets for attack reflected the theme of earlier target systems, but included a maritime flavor. It also continued the theme of the primacy of control of the air.

After 1930, the emphasis on strategic bombardment increased, along with a decline in pursuit and attack. Because of the lack of funding, aircraft development concentrated almost exclusively on large multi-engined bombers, at the expense of single-engine and two-engine aircraft that could have fulfilled the attack and pursuit roles. "The result of this struggle was to give dominance to the big plane--and to reduce pursuit to a point which was to handicap the American air effort in World War II."¹⁴ Although acquisition of pursuit and attack aircraft lagged that of bombers, the doctrine remained in the regulations and in the ACTS texts and courses.

Exercises

Tactical School participation in Army exercises shows the school's efforts to demonstrate its ideas of attacking lines of communication, and control of the air. At first, air operations in Army War College exercises were so restricted as to leave false impressions of Air Corps capabilities in the minds of ground officers. At the exercises in 1931, the situation included more aviation, but most of the air effort was applied in the combat zone rather than on rear area targets such as concentrations of troops and supplies. After the school moved from Langley to Maxwell in 1931, relations with the infantry improved due to its proximity to the infantry school at Ft Benning. In 1934, for example, the entire ACTS class was flown to Fort Benning to view an infantry battalion in an attack and to participate in an infantry terrain exercise. The next year, the ACTS students participated in an exercise air attack on ground forces. In 1933, ACTS participated in Army War College maneuvers at Fort DuPont, Delaware involving air attacks on rear area lines of communications, accumulations of troops and supplies, and depots.¹⁵

Another Tactical School instructor, Maj Donald Wilson had previously worked on the railroads as a civilian. In 1933, he noted that the destruction of a few vital links would disrupt the entire railroad system, thus isolating the front-line troops and preventing the movement of supplies and reinforcements. This was presumed to hold true for other industries as well, and reinforced the idea of attacking a few vital links in the enemy's logistical structure. Further proof was the fact that the shortage of a spring used in all constant-speed propellers and made by only one company grounded fleets of Air Corps aircraft.¹⁶

Doctrines of the Army Air Corps

By December of 1934, the "Doctrines of the Army Air Corps," proposed by the Army General Staff specified four categories of operations of the air forces: operations beyond the sphere of ground forces, in immediate support of ground forces, in defense of sea coasts, and in defense of rear areas. Targets for the first category were similar to previous ideas of targets for attack aviation, but added power plants and other utilities, and population centers (in reprisal only). For the second category, the targets were the same as Kenney had envisioned. During the battle attacks would center "upon key points in the enemy position, upon enemy units preparing for an assault, and upon enemy reserves."¹⁷ This is consistent with the idea of operational fires denying the enemy his ability to maneuver, isolating the area of operations, and destroying the enemy's reserves.

By 1935, the concept of air support for ground operations was to defeat the hostile air force (thus providing operational protection), and subsequently to deny tactical concentration to the enemy (by using operational fires). Attacking enemy lines of communications was most important; airpower was not to be employed against targets within range of friendly artillery (i.e. not part of the tactical operations). Again, this was consistent with previous concepts, but stated slightly differently. In an emergency, however, all or part of friendly airpower might be diverted to support of ground troops.¹⁸

The accuracy of attack aircraft of the day did not meet expectations, although the A-21 planes were old and did not have bomb- or gun-sights.¹⁹ A study of attack aviation in the Spanish civil war concluded that attack aviation there was used mainly in tactical support missions and was not decisive.²⁰ Air Corps leaders admitted that the American concept of attack employment had not been tested in combat. Nevertheless, attack was regarded as more useful than heavy bombardment for support of ground operations.²¹ The

ACTS Attack text reasserted the priority of missions: "It was believed that the most effective way of rendering support to ground forces was by 1) gaining air superiority over the battlefield, 2) isolating the battlefield through destruction of enemy communications, and 3) attacking troop concentrations wherever found."²² This clearly shows the concepts of operational protection and operational fires by airpower.

In November 1939, Major F.M. Hopkins, instructor at the ACTS, proposed that targets for attack should vary according to the phase of operations, these phases being concentration, advance, battle, and pursuit. In his proposal, he restated the targets for attack as those previously listed, and added defiles, chokepoints and light bridges. This expanded and reinforced the idea of vital links, or critical vulnerabilities in the enemy rear areas, advanced by Major Wilson in 1933.

Field Manual 1-5

Air Corps Field Manual 1-5, *Employment of Aviation of the Army*, was issued 15 April 1940, superseding TR 440-15. FM 1-5 was drafted by the Air Corps Board and coordinated with other Air Corps agencies, interested combat arms, and the War Plans Division. It was more conservative than the views of the ACTS alone. It prescribed attacks against enemy air forces, ground forces, naval forces, joint forces, and materiel, which would be based upon a detailed analysis of target systems and would be methodical and sustained. This showed the operational-level planning required for these attacks. The organization of air forces that it specified, however, obscured the idea of interdicting targets in the enemy's rear areas. FM 1-5 designated four functions of aviation: training and non-combat special purpose aviation, reconnaissance and liaison, overseas garrison aviation, and GHQ aviation. GHQ aviation comprised three groups: combat, reconnaissance, and transport. Combat forces were further divided into offensive and defensive air operations:

striking forces (for strategic attacks against enemy airpower), defensive forces (close-in air defense of vulnerable areas), support forces (specially trained in direct support of ground troops) and special forces (for bombardment and reconnaissance in minor operations or coastal defense).²³ Although FM 1-5 left an organizational gap between tactical attack and strategic bombardment, the types of operational-level targets and the idea of attacking beyond the range of artillery still existed in the Tactical School, until it was dissolved in the summer of 1941.²⁴

A doctrinal document designated AWPDP/1, submitted in August 1941 and approved by the War Department, represented the culmination of American pre-World War II air doctrine. It was the result of nearly twenty years of Tactical School study and analysis of the purpose and nature of warfare, the role of airpower, and the mission and tactics of the various branches of aviation²⁵. In it, airpower encompassed four basic categories of objectives: the hostile air force, ground force, naval force, and national structure. Emphasis was on the national structure, reflecting the American situation in 1939, in which the only attacks against the US interior could come by air. Operations in support of ground attacks were foreseen only "if it becomes necessary to invade the continent."²⁶ Although by 1941 attack aviation had been eclipsed by strategic bombardment, the basic doctrine of attacking vulnerable lines of communication, supplies, troop concentrations and similar targets beyond the range of ground fire, and of protecting it with pursuit aircraft, had been developed.²⁷

The Test of War

After America's entry into World War II, the pre-war concepts of interdiction, including the targets envisioned as early as World War I, and the importance of supporting it with air superiority, were quickly put to the test. These concepts were demonstrated in

the Southwest Pacific area as well as Europe, but the North African campaign and Operation Overlord serve to illustrate the use of attack and pursuit aviation.

North Africa

The first test in the European Theater was after the Allied landings in North Africa. The Allies applied the pre-war doctrine of using operational fires to lines of communication by attack aviation protected by pursuit aircraft. It is interesting to note that the attacks included heavy bombers, which had been developed not for operational, but for strategic purposes. In Tunisia, from mid-November 1942 until May 1943, two groups of American heavy bombers attacked Axis ships, harbors and dumps. Medium and fighter bombers struck mechanized forces and troop dispositions and were successful at denying food, fuel, ammunition, and reinforcements. Most attacks were protected by pursuit aircraft such as P-38 Lightnings. The interdiction operations met with good success against Axis maritime and air shipping. For example, on 28 November, 37 unescorted B-17s attacked the Bizerte docks; 2 Fortresses were lost but the bombers claimed 10 FW 190s and Me109s fighters. On the 23rd of January, again at Bizerte, one freighter was sunk, oil tanks were set afire, and workshops and hangars were destroyed. A dozen enemy planes were claimed versus no US losses. In February, the attacks shifted to shipping in the Mediterranean: 20 ships were sunk and 26 damaged within 30 days. On Palm Sunday 46 P-40 Warhawks with Spitfire escort jumped a huge formation of Ju 52 transports with approx 50 Me109 and 110 fighters escorting. 38 Junkers and 18 Messerschmitts were destroyed versus six allied fighters. Between 5 and 22 April, 253 German transport planes were destroyed. The Germans were unable to sustain their operations and withdrew from Africa in May.²⁸

The concepts confirmed in the North African campaign were the need "for a large tactical air force to achieve mastery over the invasion battlefield, (and) to attack enemy concentrations in the rear..."²⁹ Air operations demonstrated the decisiveness of operational fires directed against lines of communication which isolated the area and neutralized the enemy's critical functions and facilities. They also demonstrated the importance of protecting the attacking aircraft by pursuit aircraft. These lessons were incorporated in the planning, preparation, and execution of the invasion of the European continent. The planning reflected directly the concepts developed at the Air Corps Tactical School before the war, particularly the effectiveness of interdicting critical lines of communication, which at that time and place were the railroads; and of having air superiority.

Normandy

Air support of the amphibious landing at Normandy began two months before D-Day, on 14 April 1944.³⁰ The objectives of the plan, approved on March 25, were to eliminate the Luftwaffe threat to operation Overlord and to interdict the railway system in northern France, Belgium, and western Germany³¹ The tasks assigned were "to deplete the German air force and particularly the German fighter forces and to destroy and disorganize the facilities supporting them," and to "destroy and disrupt the enemy's rail communications, particularly those affecting the enemy's movement towards the Overlord lodgement area..."³² By this time the Combined Bomber Offensive had pounded the German aircraft industry and shot down so many German planes that the Allies had effective air superiority in northern France. The Allies had a thirty-to-one advantage over the Luftwaffe, and General Eisenhower later told the landing force that "If you see fighting aircraft over you, they will be ours."³³ Heavy bombers were diverted from the Combined Bomber Offensive to bombing of marshalling yards, locomotive repair shops, rail bridges,

and rolling stock. This interdiction overwhelmed the transport system and drastically reduced rail traffic in France. German military traffic was given priority, but there were still unpredictable and crippling delays. In May 1944, the Germans needed 100 trains a day to support von Rundstedt's Seventh and Fifteenth Armies in Northern France. Their traffic in May averaged only 32 trains a day, down from 60 a day in April and only 13 percent of what it had been in January.³⁴ This was planned to isolate the battlefield and fits the definition of operational fires.

On D-Day, the Allies flew 14,000 sorties, with losses of 127 aircraft, compared to 100 sorties and 39 losses for the Luftwaffe. The commander of the 2nd Panzer Division complained, "The Allies have total air supremacy. They bomb and shoot at everything that moves, even single vehicles and persons. Our territory is under constant observation. The feeling of being powerless against an enemy's aircraft has a paralyzing effect."³⁵

The second phase of interdiction began shortly after the invasion and was intended to prevent the movement of reinforcements to Normandy. Objectives were bridges across the Loire and Seine, crossroads, road and rail junctions, vehicles, and troop concentrations. 9th Air Force and the British 2nd Tactical Air force destroyed 551 locomotives in June. The 12th SS Panzer Lehr, 21st Panzer, 17th SS Panzer Grenadier, and 1st SS Panzer Divisions were delayed in joining the defense against the invasion due to direct air attack. The 2nd SS Panzer Division was delayed by air interdiction of rail traffic and by British bombing of its fuel supplies. The 9th and 10th SS Panzer Divisions took longer to get from Paris to Normandy than it had taken to get from the Eastern Front to France, due to interdiction of the railroads. The Allied plan anticipated that the 17th SS Panzer Grenadier Division would join the battle within two days; it did not reach the battlefield until seven days after the invasion began. Rommel said of the results of the

interdiction, "Our operations in Normandy are tremendously hampered, and in some places even rendered impossible," and "the movement of our troops on the battlefield is almost completely paralysed." This demonstrates the power of land-based air attacks as operational fires in support of an amphibious landing.³⁶

In an attempt to break out from the lodgement, the Allies attacked Saint-Lô on 18 July with 1600 heavy and 350 medium bombers, which unloaded almost 8000 tons of bombs on troops in and around the city. Saint-Lô was hit again on 25 July by 1800 bombers and almost 600 fighter-bombers in the biggest attack of its kind in the war. A Panzer training division commander reported that 70% of his troops died, were wounded, or had nervous breakdowns. Saint-Lô was taken two days later,³⁷ and the attack doctrine of the Air Corps school could claim another victory.

Conclusions

Air operations in World War II confirmed many ideas about pursuit and attack aviation that had been developed since the beginning of the first World War. In spite of the primacy of strategic bombardment in pre-war doctrine, workable concepts for attack and pursuit in support of ground and naval forces had also been developed. These concepts were appropriate, and they were demonstrated in combat. Among these ideas, which were demonstrated in North Africa and Normandy, were the need for air superiority in order to take full advantage of other operations, the efficacy of isolating the battlefield and of interdicting lines of communication and supply, the use of land-based aircraft in maritime operations, and the effectiveness of operational protection and operational fires. These ideas are reflected in airpower doctrine today: "A ground (or naval) commander will demand interdiction in many instances before air superiority has been won. Interdiction missions, except under unusual circumstances, when the benefit clearly outweighs the

risk, should not be attempted in the absence of air superiority. A commander does so at his peril, for he is likely to jeopardize his chances of ever winning it."³⁸ The development of these ideas in such a short time is remarkable considering the centuries it has taken for the framework of operational art to develop for land and naval warfare.

Operational Lessons Learned

Combat experience with air operational art during World War II highlighted several principles:

- Air forces can best support ground troops by attacking or interdicting lines of communication, supplies, troop concentrations and similar targets beyond the range of friendly ground forces.
- Air superiority in support of attack or interdiction operations is required to maintain one's freedom of action and neutralize enemy combat power.
- Interdiction can be most effective when the enemy's critical vulnerabilities can be identified and eliminated.
- Operational fires must be sustained, concentrated efforts.
- The type of operation being carried out depends upon the target, not the vehicle-- for example, strategic bombers can perform interdiction. A caveat, however, is that not all types of aircraft can perform all missions.

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⁷ Robert T. Finney, *History of the Air Corps Tactical School 1920-1940* (Maxwell Air Force Base: Air University, Research Studies Institute, 1955), p. 2-3.

⁸ Greer, p. 12.

⁹ Finney, p. 7.

¹⁰ Greer, p. 39.

¹¹ *ibid.*, pp. 66-67.

¹² Finney, pp. 29-30.

¹³ Greer, p. 42.

¹⁴ *ibid.*, p. 55.

¹⁵ Finney, pp. 14-19.

¹⁶ *ibid.*, p. 31.

¹⁷ Greer, p. 74.

¹⁸ Finney, p. 36.

¹⁹ Greer, p. 87.

²⁰ *ibid.*, pp. 102-103.

²¹ *ibid.*, p. 87.

²² *ibid.*, p. 88.

²³ *ibid.*, pp. 113-115.

²⁴ Finney, p. 42.

²⁵ Greer, p. 110.

²⁶ *ibid.*, p. 125.

²⁷ *ibid.*, p. 130.

²⁸ Herbert Molloy Mason, Jr, *The United States Air Force: A Turbulent History* (New York: Mason Charter, 1976), pp. 159-161.

²⁹ R.J. Overy, *The Air War 1939-1945* (Chelsea: Scarborough House, 1991), pp. 74-76.

³⁰ Samuel E. Morison, *The Two-Ocean War* (Boston: Little, Brown, 1963), p. 387.

³¹ Sir Basil H. Liddell Hart, *History of the Second World War* (New York: Putnam, 1970) p. 606; Overy, p. 75; Morison, p. 387.

³² Overy, pp. 74-76.

³³ Morison, p. 387.

³⁴ R.A.C. Parker, *Struggle for Survival: The History of the Second World War* (Oxford: Oxford University Press, 1989) p.199; John A. Warden III, *The Air Campaign* (Washington: Pergamon Press, 1989) p. 78.

³⁵ Mason, p. 191.

³⁶ Parker, p. 199; Warden, p. 78.

³⁷ Mason, p. 191.

³⁸ Warden, pp. 84, 85.

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